

REMARKS

In the Office Action dated April 4, 2003, claims 1-3, 6-9, and 11-31 were rejected under 35 U.S.C. § 103 over U.S. Patent No. 6,289,334 (Reiner) in view of U.S. Patent No. 6,061,690 (Nori); and claims 4 and 5 were rejected under § 103 over Reiner in view of Nori and U.S. Patent No. 5,400,371 (Natarajan).

Applicant respectfully submits that, even if Reiner and Nori can be properly combined, they do not teach or suggest the recited combination of elements in claim 1. The Office Action cites to various passages in Reiner as teaching several elements of claim 1. Specifically, the Office Action pointed to column 30, lines 22-27, and Figure 2, of Reiner as teaching the element "receiving data to be stored in a database system having plural data servers." The Office Action stated that the recited "plural data servers" read on "remote clients and servers running on heterogeneous platforms" discussed in column 30. Later, the Office Action cited to passages in columns 2 and 3 as disclosing the element "storing the partitioned data in storage units associated with the plural data servers." The Office Action stated that the recited "storage units associated with plural data servers" read on the "plural independently accessible partitions" discussed in Reiner.

Applicant notes that there is an inconsistency in how the Office Action is construing "plural data servers" in the different steps of claim 1. The "plural data servers" in the "receiving" step of claim 1 are indicated as being the clients and servers disclosed in Reiner, while storage units associated with "plural data servers" in the "storing" step of claim 1 are indicated as being the disk drives containing data partitions disclosed in Reiner. However, the Office Action has failed to identify how the data partitions (located on disk drives of a DBMS) are related to the clients and servers disclosed in Reiner. Claim 1 recites receiving data to be stored in a database system having plural data servers, partitioning the data for storage in the database system, and storing the partitioned data in storage units *associated with the plural data servers*. The disk drives for storing the data partitions of Reiner are located in a DBMS, and are not storage units associated with the clients and servers disclosed in Reiner.

Additionally, the Office Action cited to columns 2, 3, and 25 of Reiner as teaching the last clause of claim 1, namely "in response to a database query, selecting less than all the plural data servers based on the partitioning of the data to reduce a number of data servers involved in processing the database query." The passage in column 2, lines 63-65, refers to a "standard"

interface that is accessed by clients which are the sources of queries. The passage in column 3, at lines 32-52, refers to an aspect of the purported invention of Reiner that relates to the use of a "driving table" whose partitions are targeted by subqueries (decomposed from a main query). The passage at column 25, lines 39-48, refers to the problem of partition skew that results in unequal-sized partitions. The column 25 passage states that during a latter part of a query execution, and possibly even during the entire query, some partitions will have no more rows to fetch, which reduces the degree of parallelism for the remainder of the query.

None of these passages teach or suggest *selecting* less than all the plural data servers based on the partitioning of the data to reduce a number of data servers involved in processing the database query. In response to a query, Reiner actually teaches that all processing elements that are available in a multiprocessing system are invoked to perform parallel processing of the query. The passage in claim 25 cited by the Office Action states that during a latter part of a query execution, some partitions will have no more rows to fetch. This means that the processing elements responsible for such partitions were executing at some point. Another part of the column 25 passage cited by the Office Action is that possibly even during the entire query, some partitions will have no more rows to fetch. Again, the only way to know that there are no more rows to fetch is that the processing elements responsible for such partitions have to first attempt to fetch rows that satisfy the query predicate. In other words, Reiner does not disclose or suggest selecting less than all plural data servers based on partitioning of data to reduce a number of data servers involved in processing a database query.

The column 25 passage cited by the Office Action is under a sub-heading entitled "Limits of Parallelization." Thus, the passage addresses various limitations on parallel processing of a query, with unequal-size partitions being one such limit. The goal of Reiner is to enhance parallelism. See Reiner, 2:31-36 ("Unfortunately, prior art DBMS's have not proven capable of taking full advantage of the power of such multiprocessing systems and, particularly, their power to simultaneously process data (in parallel) from multiple partitions on multiple storage devices with multiple central processing units."). As further stated by Reiner, "the bucket size is chosen to insure that hash buckets are spread over storage devices to maximize the potential for parallel access." Reiner, 10:48-50. Moreover, Reiner states that "the database 72 is organized to achieve the best mix of I/O parallelism and hit ratio" since greater I/O parallelism means that more threads can be used, in parallel, to initiate data retrievals. Reiner, 10:62-67. In view of the

foregoing, it is respectfully submitted that there is no teaching or suggestion of selecting less than all the plural data servers as recited in claim 1.

Nori fails to provide the requisite suggestion of the elements indicated above as missing from Reiner. Therefore, even if they can be properly combined, the combination of Reiner and Nori does not teach or suggest the invention of claim 1.

Applicant notes a further error in how elements of claim 1 are characterized. The Office Action states that the passage of column 11, lines 25-37, of Nori, teach the element "receiving information associated with at least one characteristic of the data," with the Office Action stating that the information associated with a characteristic of data reads on "a set of parameters" described in column 11 of Nori. The passage of column 11 refers to functions each receiving a set of parameters. The set of all function names and their parameters defines an application programming interface (API) to the functions. Nori, 11:33-35. There is no indication that the input parameters to the functions constitute "information associated with at least one characteristic of the data." Furthermore, the "receiving" step of claim 1 cannot be read in isolation—the claim further recites that the information associated with at least one characteristic of the data is used to partition data for storage in storage units associated with plural data servers. There is absolutely no indication in Nori to tie the set of parameters to the functions to partitioning of data. Therefore, there can be no teaching or suggestion in Reiner and Nori of the claimed subject matter.

Furthermore, there is simply no suggestion to combine Reiner and Nori. Reiner focuses on intercepting a main query and decomposing the main query into subqueries for submission to a database management system. Reiner, 2:61-3:3. Nori refers to storing information object collections in a database, with object collections including nested tables and variable length arrays. The teachings of Reiner and Nori are unrelated to each other. It is unclear to Applicant, and the Office Action has provided no rationale regarding, how the teaching in Reiner with respect to decomposing a main query into plural subqueries can be combined with the teaching in Nori of storage of object collections such as nested tables and variable length arrays. The Office Action stated that "[i]t would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Reiner et al by the teaching of Nori et al, because receiving information associated with at least one characteristic of the data, would enable the user to receive relational information about the data and define the relationships

between data segments partitioned and stored in the plurality of storage devices." The cited motivation to combine the references is defective, because the input parameters to functions disclosed by Nori cannot constitute the information relating to a characteristic of data recited in claim 1, and moreover, the input parameters to functions of an API disclosed in Nori have nothing to do with the decomposition of a main query into subqueries disclosed in Reiner. Therefore, the obviousness rejection is further defective because there is no motivation to combine Reiner and Nori.

Independent claims 11 and 19 are allowable for similar reasons.

Allowance of all claims is respectfully requested. The Commissioner is authorized to charge any additional fees, including extension of time fees, and/or credit any overpayment to Deposit Account No. 50-1673 (9261).

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Date

Respectfully submitted,



Dan C. Hu, Reg. No. 40,025
Trop, Pruner & Hu, P.C.
8554 Katy Freeway, Ste. 100
Houston, TX 77024
713/468-8880
713/468-8883 [fax]